

**Calavera Hills and Robertson Ranch
Habitat Conservation Area**

(Dedicated natural areas set aside as part of the
Calavera Hills Phase II and Robertson Ranch developments)
(CNLM No. S031)

Annual Work Plan

October 1, 2011 – September 30, 2012

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U.S. Fish and Wildlife Service

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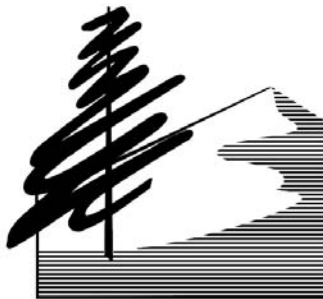
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I. Introduction and Summary

This work plan has been developed from the guidelines for goals and objectives set forth in the Calavera Hills Phase II Final Habitat Management Plan (HMP)(Planning Systems 2002), the Robertson Ranch East Village Open Space Land Management Plan (Planning Systems 2006) and the Robertson Ranch West Village Open Space Preserve Land Management Plan (Planning Systems 2007). These Habitat Management Plans have been reviewed by and agreed upon by the City of Carlsbad, United States Fish and Wildlife Service (USFWS) and California Department of Fish and Game (CDFG).

The Center for Natural Lands Management (Center, CNLM) holds conservation easements (since June 2006 for Calavera Hills Phase II, and February 2007 for Robertson Ranch East Village, and December 2007 for Robertson Ranch West Village Parcel 23C Phase I) on the Calavera Hills and Robertson Ranch Habitat Conservation Area (HCA) and performs or oversees the tasks identified in the three Habitat Management Plans (collectively HMP's).

The HCA is comprised of seven parcels, commonly referred to as Village H, R, U, W, and X, Robertson Ranch East Village, and Robertson Ranch West Village PA 23C Phase I, the first phase of a two phase parcel recordation process. CNLM has merged the funding and reporting for these two areas as we provided the developer a financial discount for selecting CNLM to manage both properties. In other words, the funding for the Robertson Ranch areas is less than what we would normally charge had we not already received funding for the Calavera Hills Phase II areas. This will also simplify future budgetary, reporting, and planning considerations.

The purpose of this work plan is to identify the tasks and budget required to complete the management activities for the upcoming management year that will begin on October 1, 2011 and end on September 30, 2012. Unless otherwise stated, all tasks will be performed by Center's Preserve Managers Patrick McConnell and Jessica Vinje and Rangers Zadok Othniel and Roberto Bejar.

Summary of Tasks and Goals for the Management Year:

- Maintain signs and existing fences
- Continue blocking unwanted trails
- Conduct habitat assessments of thread-leaved brodiaea (*Brodiaea filifolia*), and San Diego thornmint (*Acanthomintha ilicifolia*)
- Continue monitoring coastal sage scrub (css) long-term monitoring plots
- Begin Village H Partner's restoration project
- Monitor and control nonnative, exotic plants
- Maintain the habitat restoration project at Village R
- Continue communications as needed with the neighboring HOA's
- Conduct weekly patrol visits, continue blocking unwanted trails
- Remove trash as necessary
- Conduct conservation easement (CE) compliance

- Prepare and provide to the wildlife agencies and City of Carlsbad an annual report that describes the management activities and information gathered during the management year.
- Finish an updated management plan
- Provide an accounting of funds to be spent in the management year

Appendix 1 (Task Schedule) identifies the approximate schedule of tasks for the upcoming management year. The location of the HCA is shown in Appendix 2.

II. Management Activities

The following sections identify and describe the activities to be performed during the upcoming management year. Based upon the Property Analysis Record (PAR) developed by CNLM to outline long-term management tasks and costs, management activities can be categorized into several groups: Capital Improvements, Biological Surveys, Habitat Restoration, Public Services, Conservation Easement Compliance, Reporting, Office Maintenance, and Operations. Each of these categories will be discussed below.

A. Capital Improvements

The installation of signs and fences will occur during this management year.

1. **Signing** Signs will be maintained at all of the major access points and along most of the perimeter to the HCA and a few other notable locations. Each sign explains that the HCA is a dedicated as a habitat preserve, and that fire, off-road vehicles use, dumping, and shooting are prohibited.
2. **Fencing** We will continue to block unwanted trails in Village U and elsewhere with anchored vegetation where possible, and fencing where necessary. As mentioned in the previous work plan, we may install short sections of fencing in combination with anchored vegetation along the eastern margins of Village U in order to dissuade mountain bikers.

B. Biological Surveys

Biological monitoring activities will follow items listed in the HMPs. CNLM has modified monitoring tasks outlined in the HMPs to adjust the task time lines and some of the tasks which it finds to be unnecessary at this time. Below is a description of the tasks that will be accomplished during the upcoming management year. In addition, Table 1 outlines all tasks that will be completed at the HCA and an associated time line for the next 5 years.

Monitoring during the next year includes habitat assessments for the two federally listed plant species; and the third year of a long-term css monitoring program. All data will be entered or

stored in a Geographic Information System (GIS) database, or in MS Excel. Brief descriptions of monitoring activities outlined by taxa are provided below:

1. **Animal Surveys**

No protocol animal surveys are scheduled this management year. We will map any sensitive animals observed while carrying out other duties. We may enlist the help of a volunteer currently showing interest in sampling Argentine presence in the array sampled previously and reported in cnlm 2009. We are still interested in whether Argentine ants can be controlled, and another survey of the extent of their presence may help us in determining locations for placing control measures.

2. **Vegetation Surveys**

- a. **Coastal sage scrub (css) long-term monitoring** Three consecutive years of css monitoring have been completed. This management year marks the first year return to our rotating plots first measured in 2009. We have consulted with Dr. Douglas Deutschman of San Diego State University for sampling design considerations and analyses methods. More information about the justification for these plots, and the sampling design is provided in Appendix 3.
- b. **San Diego thornmint habitat assessments** Habitat assessments will be conducted in Village X parcel. These assessments will be performed by using point-intercept from quadrat sampling in stratified-random locations inside the thornmint population. As with previous years, cover by species, species diversity, and edaphic information will be collected using the point-intercept estimates.
- c. **Thread-leaf brodiaea index plots** A strategy to sample representative localities of thread-leaf brodiaea (TLB) has been developed that involves a combination of non-parametric and parametric procedures at determining both spatial distribution and density, respectively. A draft document is being developed that contains the rational and methodology for a dual measures approach to monitoring TLB.
- d. **Wiggins' popcorn flower** Refer to CNLM 2011 for information relating to current known extent of *Cryptantha wigginsii*. Surveys will be conducted for this species where found in two previous survey years in the vicinity of css plot #5. No further collections will be taken unless the locality is deemed sustainable. We may have inadvertently eradicated this locality from oversampling prior to knowing the identity of the species, but it was already in exceedingly low numbers prior to our collecting.

Table 1. Schedule for Biological Monitoring Tasks

Monitoring task	2011/2012	2012/2013	2013/2014	2014/2015	2015/2016
Focused sensitive reptile surveys ¹		TBD	TBD	TBD	TBD
Native and non-native ant surveys		TBD	TBD	TBD	TBD
Coastal California gnatcatcher surveys (including observations of other sensitive avian species)		X		TBD	TBD
Native grassland vegetation community assessments		X		X	
Coastal sage scrub quantitative monitoring ²	X	X	TBD	TBD	TBD
San Diego thornmint surveys ³	X	X	TBD	TBD	TBD
Thread-leaved brodiaea surveys ⁴		X	TBD	TBD	TBD
Wiggins' popcorn flower surveys	X	X	X	X	X
San Diego thornmint and thread-leaved brodiaea habitat assessments	X	X	TBD	TBD	TBD

1. Focused reptile surveys will occur in lieu of installing and monitoring pitfall arrays. Pitfall arrays will not be installed because the HCA is heavily used by the public. Based on Center experience, these arrays would likely be vandalized.

2. CNLM initiated coastal sage scrub quantitative monitoring during the 2008-2009 management year.

3. Two San Diego thornmint found May 2008 near northwestern boundary of Village X parcel. Four found Spring 2009, and two in 2010. None were found during 2011.

4. All locations found and accounted for as of 2010; thus no need for further counts, but CNLM will initiate index plot setup during 2012, if environmental conditions are suitable.

- e. Other rare plants** Small flowered microseris (*Microseris douglasii* var. *platycarpa*) will be censused where found. If time and conditions permit, Palmer's grappling hook (*Harpagonella palmeri*), western dichondra (*Dichondra occidentalis*), and small-flower bindweed (*Convolvulus simulans*) will be mapped where found. Other sensitive plants will be censused and mapped, if located. See CNLM 2011 for results of activities carried out during 2010-2011 management year. Table 2 lists probable threats to sensitive plants known to occur in the HCA.

Table 2. Sensitive plant threats.

Name	Threats	Actions Planned
Thread-leaved brodiaea MHCP ₁ , FT ₂	Human disturbance Non-native grasses and forbs	Frequent patrol Yearly habitat assessments ₃
San Diego thornmint MHCP, FT	Human disturbance Non-native grasses and forbs	Frequent patrol Yearly habitat assessments
Small-flowered microseris ₄ CNPS List 4.2	Human disturbance Non-native grasses and forbs	Frequent patrol
Wiggins' popcorn flower	Human disturbance, Non-native grasses and forbs	Search in suitable soils for other localities, early counts (if present)
Western dichondra ₄ CNPS List 4.2	Human disturbance	Frequent patrol
Palmer's grapplinghook ₄ CNPS List 4.2	Human disturbance Non-native grasses and forbs	Frequent patrol
Small-flower bindweed ₄ CNPS List 4.2	Human disturbance Non-native grasses and forbs	Frequent patrol Yearly habitat assessments coincident with thornmint & brodiaea surveys
Nuttall's scrub oak (<i>Quercus dumosa</i>)	Human disturbance	Frequent patrol
California adolphia ₄ CNPS List 2.1	Human disturbance ₅ Non-native grasses and forbs	Frequent patrol CSS monitoring

1 MHCP refers to Multi Habitat Conservation Program for Northern San Diego County, these species are listed under the Carlsbad HMP (Habitat Management Plan), thereby requiring certain management measures to attain.

2 FT = Federally listed as threatened.

3 Habitat assessments determine whether weed removal activities are needed. For non-focus species, long-term css monitoring will determine trends in non-native cover that can then be actionable. Other direct threats to native cover such as trails or vandalism can be observed and noted during regular patrol activities.

4. In many cases, Palmer's grapplinghook and small flowered morning glory co-occur with San Diego thornmint and/or thread-leaved brodiaea. In these cases, detailed cover data will reveal changes in cover values that may be detrimental. Since neither of these species, or other non-MHCP listed species are a priority for study, long-term css monitoring (Appendix 3), and coincidental information derived from thornmint and brodiaea studies will be relied upon for trend information.

5 Human disturbance includes fire and physical damage due to any number of activities. Fire is a threat since a fire may be vigorously controlled at the expense of the landscape, and because fire return intervals will more likely than not be shorter than that which the plant communities are adapted to. Finally, fire can open the landscape up to further encroachment as well as erosion processes that may be exceedingly difficult to manage.

C. Habitat Restoration and Maintenance

Most of the HCA's habitat is good quality, with little disturbance from nonnative plant species. There are nonnative exotic plants scattered throughout the HCA, however. CNLM has budgeted for continuing the eradication efforts in Village H, X, and Robertson Ranch parcels.

1. **Village H weeds** Fennel, crown daisy (*Chrysanthemum coronarium*), artichoke thistle (*Cynara cardunculus*), and Bermuda-buttercup patches will continue to be controlled in this area of the HCA. Since 2006, the southern end of Village H has been periodically mowed and skid-sprayed in order to reduce the seed production of persistent weeds. Fennel has again become common throughout Village H since the contracted treatments of 2006, and so we will obtain a crew for treating fennel during spring 2012.
2. **Robertson Ranch and Village X weeds** Black mustard and other weeds will be treated and/or removed along the western areas of Village X parcel. This area holds much promise, as it surrounds thread-leaved brodiaea localities, and has many small-flower bindweed present that may continue increasing density. Native shrubs are also colonizing the openings.
3. **Village R restoration** Village R is re-vegetating very well, mostly by way of natural recruitment of native shrubs and grasses. Nonnative plant species will be removed via herbicide application and manual weeding, as needed.
4. **West Village and East Village re-vegetation** CNLM will continue to work with developers and assigned contractors to ensure that faithful compliance with re-vegetation plans is carried out and that pertinent documents are made available wherever possible. The remainder of PA23C that was planned to be restored is currently in the early stages of restoration, and we will be helpful to contractors responsible for the restoration areas whenever possible.
5. **Village H restoration** CNLM has received approval through the USFWS for matching funding through the Partner's for Fish and Wildlife program to restore an approximately 5-acre portion at the southern end of Village H. We have accessed the water atop this future restoration and are planning on installing irrigation followed by out-planting the site by mid-winter 2012. CNLM intends to use volunteers and school children to the maximum extent practicable. See CNLM 2011 Appendix 4 for more information.
6. **Assemblages of special significance** One or more areas will be identified to receive long-term attention to monitor for threats like purple falsebrome (*Brachypodium distachyon*), habitat degradation through human usage, or other edge effects. Among these areas will obviously include the localities where TLB and San Diego thornmint occur, but we may also identify one or more openings that house typically dense assortments of mosses (*Selaginella* spp.) and liverworts (*Asterella* sp.), and typically also contain annual herbaceous flowers such as chia (*Salvia columbariae*), golden-ray pentachaeta (*Pentachaeta aurea*), and tidy tips (*Layia platyglossa*), among others.

Typically, the soils tend to be composed mostly of clay. Although such local assemblages may have lacking information as to their functional importance, they appear under threat of disappearance, and make up a small percentage of the total land-cover among our preserves. In this and subsequent years CNLM will work towards identifying cohesive locations like these on GIS by marking boundaries and noting nearby threats.

Thenceforth, we will visit locations bi-annually: noting threats and implementing habitat maintenance in cases where habitat quality is in decline and manpower or financial circumstances allow. The previous work plan (2010-2011) detailed an exotic grass control study, but CNLM could not fit this into our increasingly busy schedules, and hereafter this idea has been shelved in favor of more monitoring of areas currently either in good condition, or under threat of degradation. Good examples of areas that appear healthy are the clay soils along the edge of chaparral habitat in the eastern parcel of Village K. Some of these openings offer colorful wildflower displays late into each spring season, and therefore potentially serve as pollen and nectar sources for native Dipteran and Hymenopteran insects. Other openings like this exist in almost every parcel in this HCA, but some appear to be nearing invasion by non-native grasses and/or forbs.

D. Public Services

Public services activities include patrols; meetings and discussions with neighbors, HOA representatives, and landscapers about perimeter landscaping; and responding to emergencies. However, other opportunities for public service will undoubtedly be forthcoming during the year with local groups and individuals interested in volunteering labor for HCA projects, and class field trips from local schools. Whenever possible, management will try to accommodate these activities.

1. **Outreach** The landscaping bordering the HCA is typically high-water use. The result of this hydrophilic vegetation is excess water seepage into HCA edges, which will replace dry-adapted vegetation with wetland vegetation, and favors the establishment of weeds. CNLM has worked with HOA representatives and landscapers regarding this matter, and there has been remarkable improvement. See CNLM 2011 for further discussion regarding the seepage area of Village X, and the golf ball driving activities addressed in Appendix 5. We will continue to work with the HOA's bordering the HCA to ensure that weeds like Pampas grass and physical issues like excess water and littering are dealt with promptly.
2. **Patrols** Patrols will be performed approximately four times per month, and also during biological surveys or other HCA activities. Patrols include the routine maintenance of fences, signs and trash removal. Observations of sensitive species, negative human effects, new weed infestations, and trash will be gathered during patrols as well.
3. **Emergency Response** Staff time has been allocated from the current budget for response to emergencies on the HCA. Such emergencies could include response to wildfires, wildlife problems reported by neighbors, and trespass issues.

E. Conservation Easement Compliance

The HCA Manager will monitor compliance of all areas of the Conservation Easement to ensure the conservation values are maintained in perpetuity. This process insures CE's are being managed appropriately, and ensures continuity of process. Compliance visits are to be carried out during the later portion of the management year. The next management year will encompass the sixth CE Compliance visit cycle for Calavera Hills parcels, and the fourth CE Compliance visit for Robertson Ranch parcels. All parcels are included in the same annual CE compliance since the 2008-2009 management year.

F. Reporting

Reporting requirements include the management of database/GIS systems, the photo-documentation stations, and the production of various status reports to the City of Carlsbad, USFWS, CDFG, and Center administration.

1. **Database/GIS Management** Data derived from routine patrols and photo-documentation will be entered into and maintained in the HCA's existing database/GIS system. Additional databases will be established for the various biotic monitoring programs including the production of historical and current vegetation maps. Efforts will be made to coordinate and standardize database fields and parameters with other HCA's.
2. **Reports**
 - a) **Year-End/Agency Reports** A year-end report will be prepared by December of 2012 detailing the results of the year's management activities. This report will include recommendations for the continuation of various activities for the following management year and will be submitted to the City of Carlsbad, USFWS, and CDFG, as required under permit reporting conditions.
 - b) **Annual Work Plan** The annual work plan for the 2012-2013 management year will be formulated by the end of the 2011-2012 management year and will be based upon experiences during previous years' operations. This work plan will be submitted to the City of Carlsbad and USFWS and CDFG.
 - c) **Management Plan Preparation** It has been roughly nine years since the *initial* management plan was drafted for this HCA (Planning Systems, 2002). We have budgeted for the completion of an updated management plan during this management year. Much of the first draft has already been completed as of this Plan; we expect to finish with a final management plan by January 2012.

G. Office Maintenance

HCA management will maintain offices in an organized manner to facilitate maximum efficiency. This section of the budget includes outlays for general office work, utilities, and telephones, among other items/tasks.

H. Operations

Operations include the training and professional growth of Center personnel, and inspection of the HCA by Center administration. Funds have been allocated in the current budget for the HCA Managers to attend classes or seminars during the upcoming year. Also included within this category of activity is the conduct of employee reviews.

III. WORKLOAD AND BUDGETS

A. **Supervision and Staffing:** The Regional Preserve Manager will be supervised by CNLM's Director of Conservation Science, Dr. Deborah Rogers. Tasks and hours will be coordinated by the Regional Preserve Manager and approved by Dr. Rogers. The Regional Preserve Manager, Markus Spiegelberg, will supervise the HCA Preserve Managers and Rangers.

B. **Budgeting:** A budget of \$70,153.89 has been allocated for this management year. Every effort will be made by HCA Management to allocate time and expenses according to this estimated budget.

IV. REFERENCES

CNLM. 2011. Calavera Hills and Robertson Ranch Habitat Conservation Area Annual Report October 2010 - September 2011.

CNLM. 2010. Calavera Hills and Robertson Ranch Habitat Conservation Area Annual Work Plan. October 2010 - September 2011

CNLM 2009. Calavera Hills and Robertson Ranch Habitat Conservation Area Annual Report October 2008- September 2009.

Merkel & Associates. 2004. Biological Resources Report for the Robertson Ranch Project Carlsbad California. August 2004.

Planning Systems. 2002. Calavera Hills Phase II Final Habitat Management Plan. October 2002.

Planning Systems. 2006. Robertson Ranch East Village Open Space Land Management Plan.
November 2006.

Planning Systems. 2007. Robertson Ranch West Village Open Space Preserve Land
Management Plan. September 2007.

V. APPENDICES

Appendix 1. Task Schedule

Task	October- December 2011	January- March 2011	April to June 2012	July to September 2012
Sensitive Plant Habitat assessments			X	
Wiggins' popcorn flower Surveys			X	
Coastal Sage Scrub Monitoring			X	
Village H native grassland transects				
GIS/Database				X
Identify and GPS lens and other openings considered spatially restricted		X		
Village R Restoration	X	X	X	X
Village H Restoration	X	X	X	X
Nonnative Plant Removal (Including contractors)		X	X	X
Fencing/Signage/Trail Blocking				X
Patrolling	X	X	X	X
Reports & CE Compliance				X
Position Paper			X	X
Management Plan	X	X		
HOA Outreach	X	X	X	

Appendix 2. HCA Location Maps

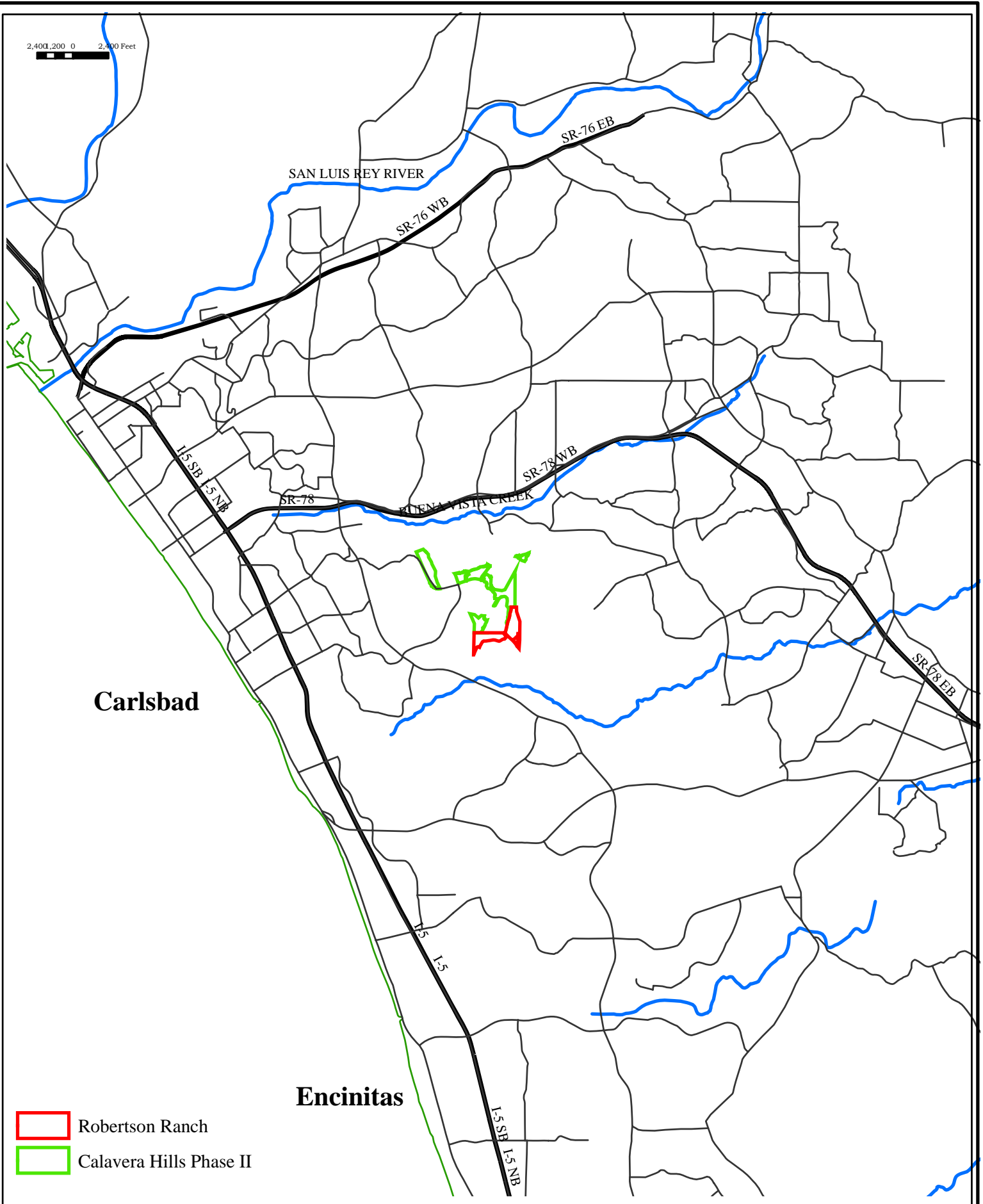


Figure 1
Preserve Vicinity
Robertson Ranch and Calavera Hills Phase II Habitat Conservation Area - Carlsbad, CA



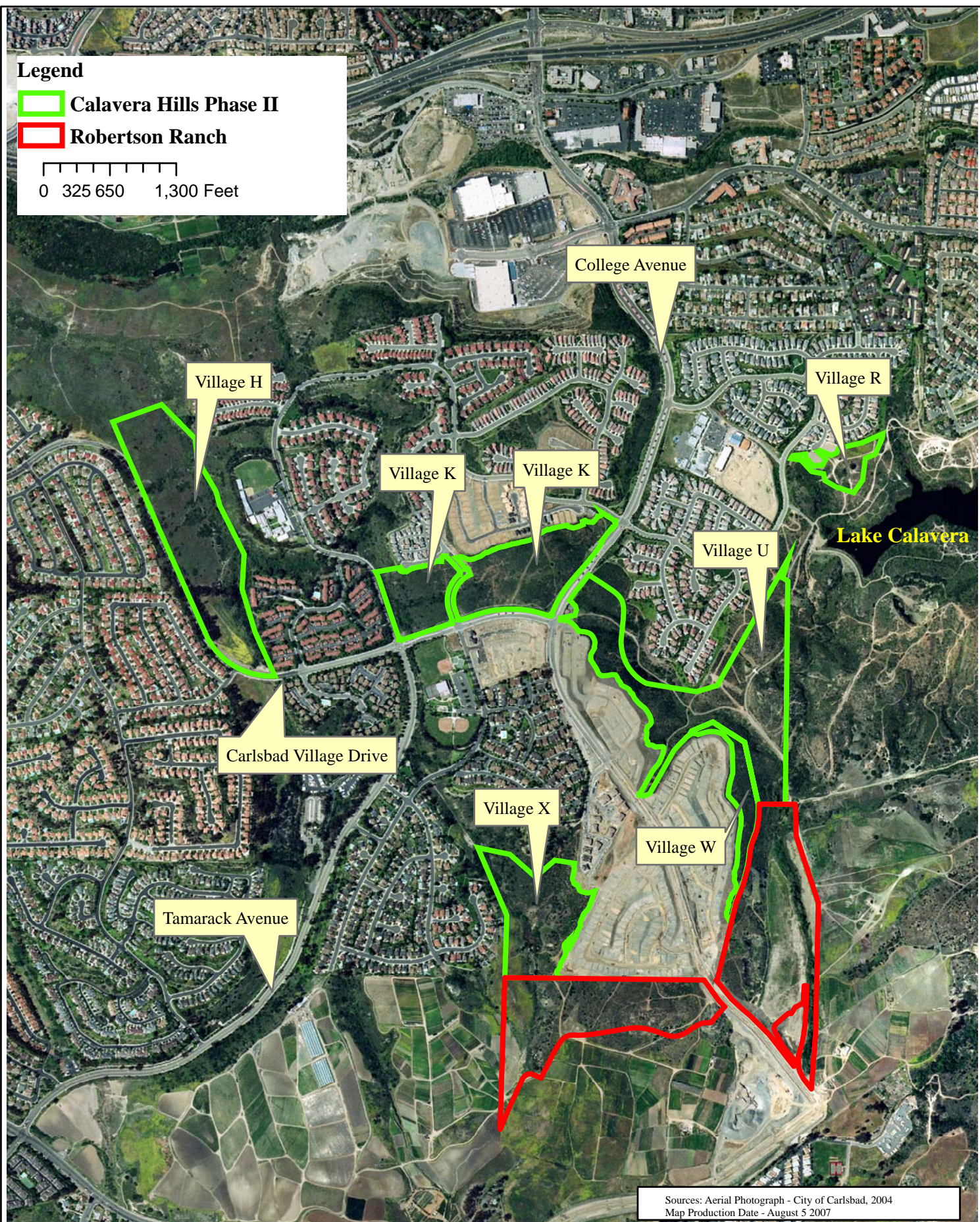


Figure 2
Preserve Location Map
 Calavera Hills Phase II and Robertson Ranch - Carlsbad, CA



Appendix 3. Coastal Sage Scrub Long-Term Monitoring Plan

The Center for Natural Lands Management-San Diego: Coastal Sage Scrub Monitoring Plan

Objective: Track the changes in structure and composition of the coastal sage scrub (CSS) community.

- a. Use data to evaluate the structure and composition of the CSS vegetation community and its correlation to predictions of vegetation changes based on theories postulated by ecological and threats models.
- b. Use data to evaluate changes or trends in “populations”, presence/absence and/or occupied/unoccupied habitat of sensitive animal species, primarily the coastal California gnatcatcher (*Polioptila californica californica*)(CAGN).
- c. Use data to evaluate changes in species richness.
- d. Use data to evaluate changes over time from a baseline vegetation pattern.
- e. Use data to guide vegetation management decisions (i.e. nonnative plant removal, rare species range increases/introductions).

Background of Need:

The Center for Natural Lands Management (CNLM) manages several thousand acres of CSS in San Diego County. These areas host many threatened, endangered and sensitive plant and wildlife species, provide for wildlife movement and are some of the last remaining stands of CSS in coastal San Diego. These areas were also specifically designated as important areas to conserve under the regional Habitat Conservation Planning (HCP) conservation efforts.

As a result, the CNLM needs to be able to evaluate recruitment and vigor of this vegetation community over time to guide management decisions and to evaluate changes in plant and animal communities. This monitoring will also provide an opportunity to evaluate theorized predictions of changes in vegetation communities resulting from urbanization, nonnative species invasion, global warming, increased edge, altered fire regime and fragmentation (to name a few).

Background of Ecological Model and Threats

CSS is a fire-adapted vegetation community with fires occurring naturally, but most severely under the extreme Santa Ana heat and winds of late summer and fall and during drought conditions. During these conditions there would generally be a “complete burn” where all above ground vegetation within the fire’s path would be consumed. After such a fire, herbaceous plants (fire followers), which are known to sprout after fires, would dominate the landscape for a few years. Over time (3-5 years) the shrub lands would regain their dominance, and after 5-10 years a mature assemblage of plants and wildlife would again be found on site (Dallman 1998).

The fire frequency in CSS is as frequent as chaparral due to the volatile oils and resins that occur in CSS plants. The plants, such as white sagebrush (*Salvia apiana*), are able to resprout after a fire or produce many seedlings from the dormant seed bank that lies in the soil. Seed germination of some species may also be stimulated by fire (Holland and Keil 1995, Dallman

1998). However, if the fire frequency and intensity are too great, plants in the CSS community, such as black sage (*Salvia mellifera*) and California sagebrush (*Artemisia californica*) are permanently killed and can no longer regenerate, slowly converting the CSS community to a nonnative, annual grassland (Southwest Division, Naval Facilities Engineering Command 1998).

Each CNLM preserve in San Diego has a different fire history and a different predicted fire future. For example, most of the Rancho La Costa (RLC) Habitat Conservation Area (HCA) burned in the Harmony Grove fire in October of 1996, while the Manchester HCA has not burned (except two very small fires) in its entirety since 1917. Prior to 1917 no data are recorded, so it is uncertain as to when the last significant fire event occurred in the Manchester HCA.

Regardless of fire history and the current vegetation characteristics, there are many realized or potential threats to the integrity of the CSS vegetation community (See RLC Habitat Management Plan CSS Ecological Model and Threats Section (CNLM 2005) that need to be evaluated including:

1. What is the effect of an altered fire regime at each HCA?
2. What is the potential effect of global climate change?
3. What are the effects of urban edge?
4. What are the effects of fragmentation and isolation?
5. What are the effects of altered wildlife usage patterns?

The answers to these threats questions lead to other questions that are associated with effects on ecological processes and patterns, such as:

1. Are the variables investigated representing a threat?
2. At what spatial scale are the variables representing a threat?
3. How do the effects of the threats listed above effect the distribution and abundance of sensitive plant and wildlife species?
4. How do the threats listed above effect the distribution of non-sensitive plants and animals?
5. How do the effects of each threat alter ecological processes?
6. How do the various measured factors interact?

Predictions

Fire. We predict that as a result of fragmentation, complete burns of preserves are now less likely and that there will be fewer, smaller fires resulting in a mosaic of CSS with various age structures.

Global Climate Change. We predict that rainfall patterns will change (likely decrease) over the next 100 years resulting in a lengthening of the fire season, increased frequency of lightening fires, increased frequency of drought, and areas burned. We predict:

1. Possible regime shifts (altered abundance and recruitment patterns in various native vegetation assemblages)
2. Altered invasion severity of exotic species due to changes from native-adapted variations in weather phenomena
3. Lowered native seedling survival of species due to changes from native-adapted variations in weather phenomena
4. Lowered seed and/or clonal production of future generations due to changes from native-adapted variations in weather phenomena
5. Negative interactions between native wildlife and changes resulting from the above mentioned predictions in vegetative cover

Habitat Fragmentation and Urban Edge. We predict that habitat fragmentation will reduce plant diversity and migration and/or genetic exchange between plant populations. This could affect the CSS community by reducing vigor within populations and eventually leading to extinctions of specific plant species.. Habitat fragmentation has resulted in an increase of urban edge on all our preserves. We predict that this will result in increased pressures from nonnative plant species, illegal vegetation clearing, dumping, erosion, and other threats that will change the vegetation structure and composition.

Monitoring Methodology

Approximately fifty plots will be established inside three of our preserves, and the number per preserve allocated by the amount of acreage currently occupied by CSS in each preserve. These plots will be placed in a stratified random manner across our preserves. Stratification will take into account:

1. Size of preserve
2. Slope and aspect
3. Distance from preserve edge/urban edge
4. Presence or absence of CAGN or San Diego horned lizard (*Phrynosoma coronatum blainvillii*)
5. Fire history

Plot Design and Setup

The plot design will be of a modified Whittaker nested vegetation sampling design as in Stohlgren et al. 1995. The dimensions of the macroplot will be 50 meters long by 20 meters wide. Three smaller nested plots will be placed inside the macroplot. The larger of these three is to be 20 meters long and 5 meters wide, placed in the center of the macroplot, with the long axis corresponding to that of the macroplot. The two other nested plots will be at opposite corners of the macroplot, and will be 5 by 2 meters in length, again with the long axis corresponding to that of the macroplot. The design of the modified Whittaker plot we are using deviates from that described in Stohlgren et al. 1995 by not including the 12 smaller 1-square meter rectangles. The long axis of the modified Whittaker plots will be set to cross the environmental gradient present at the macroplot location. Sampling will be carried out for both continuous variables (percent cover by species) and non-parametric and semi-continuous variables (count of dead shrubs, species richness).

Point Intercept Data (Percent Cover)

Percent cover by species will be gathered by running a point-intercept transect along the upper border of each macroplot. The point-intercept transects will be measured at half meter intervals, thus generating 98 “hits” along the long (50 meter) side of the macroplot. Living plants will count as a point or “hit,” if a 1.5 millimeter dowel is intersected in the vertical plane by the living tissue of a plant. At each half meter, data pertaining to bare ground, rock, or litter incident with the dowel will also be collected. Dead branches attached to a living shrub do not count as a “hit.” If a completely dead shrub is incident to the dowel along the point intercept line, that shrub is noted by species (if possible) in a separate column from living plant “hits.” The hope is that this may generate information pertaining to large-scale shrub die-off, as has been recently noticed, but had gone quantitatively undocumented in the Rancho La Costa HCA.

Species Richness

Information gathered inside the smaller sub-plots located inside each macroplot will include species presence. Each species occurring within the sub-plot is recorded. Plants are identified to species and subspecies whenever possible.

We obtained shrub counts in our plots during our first year of sampling ($N = 17$ macroplots), and found that any counting inside subplots in addition to noting species richness cannot be supported on our HCA endowments. Collecting species richness in these subplots is the most time-consuming portion of each visit.

Sampling intensity

CNLM met with Dr. Douglas Deutschman at San Diego State University to inquire into methods of maximizing our return from our effort. We could not afford to monitor more than approximately 20 macroplots per year. Also, the effects of trampling could mislead our conclusions about trend over time if we re-visited the same sites every year over the course of many years. It is necessary to capture the yearly variation in conditions such as rainfall and temperature, and therefore we knew that many replicates would be needed in order to capture meaningful patterns.

Dr. Deutschman suggested a “rotating panel” approach. This approach incorporates visiting a subsample of all macroplots on a yearly basis, ensuring to balance the replicates according to aspect and to spread these replicates across the landscape in order to capture variation in weather or rainfall that may take place across our sample region. It was suggested that we re-visit eight macroplots over the course of three years, while rotating 12 or more new macroplots over the course of the three years. Therefore, after the third year of sampling, roughly 50 plots have been visited, and the variation in measures among the eight re-visit macroplots can be compared to the rotating macroplots. In this manner we can judge if yearly re-visits are necessary in the long-term, or if more sites are needed each year.

For instance, one potential outcome is that the region in which we are sampling does not vary substantially in factors influenced by weather or disturbance, and that by stratifying sub-sampling across the region and visiting a subsample of the whole, we can adequately capture the variation in vegetative and species richness measures without overtaxing our annual budgets. Another potential outcome is that we will obtain substantial information from this rotating panel design to indicate how many more sites should be visited on a yearly basis to capture the yearly variation without visiting the entirety of our plots.

Rational for a Two-Tiered Approach

The data collected in the macroplot, and smaller sub-plots will be useful in generating species area curves and (more importantly) in documenting species presence or absence, as well as recruitment and mortality over time. The advantages of using a multi-scaled approach to quantifying species richness are identified in Stohlgren et al. 1995. As the years progress, small changes in species presence or seedling recruitment may be observed as disappearances, appearances, increases, or decreases on the micro-scale of sub-plot. The appearance of nonnative species may be quickly identified on the macroplot scale, while the disappearance or lack of recruitment among native shrubs may be apparent on the smaller plot scale prior to any notice of change on the macroplot scale.

The point-intercept transect measures will provide a method of quantifying change in abundance by species and edaphic cover which may also tie into species richness changes observed within the sub-plots. For instance, nonnative grasses and/or litter cover changes may be predictive as explanatory variables in a multi-factorial analysis of the response variables mortality or species decline. Other variables that may be tied into a model explaining the measured pattern may include regional rainfall totals for the season and/or seasonal temperature averages, slope and aspect of macroplots, fire history, and the presence or absence of animal herbivory.

References

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Appendix 4. Partner's for Fish and Wildlife Grant

Calavera Hills (Village H) Coastal Sage Scrub
and Grassland Habitat Restoration
Partner's for Fish and Wildlife Project Work Plan

Work Plan Date: July 2011

Landowner: Thompson Corporation

Conservation Easement Holder and Applicant: Center for Natural Lands Management
215 West Ash St.
Fallbrook CA, 92028
760 731 7796

Project Manager Contact Information: Patrick McConnell
215 West Ash Street
Fallbrook CA, 92028
(619) 567-7401
pmcconnell@cnlm.org

Project Size/Location: Calavera Hills, Village H: 5 acres
UTM E: 623849 N: 2006244
Map attached

Total Project Cost/Basic Costshare breakdown: FWS PFW: \$ 7,000.00
CNLM: \$ 9,221.00

I. Introduction

Description of Calavera Hills, Village H Project Area

Calavera Hills and Robertson Ranch Habitat Conservation Area, Village H parcel

This parcel is situated in north-central Carlsbad, and is entirely under permanent conservation easement granted from the developer (Calavera Hills II LLC) to the Center for Natural Lands Management. Thompson Corporation owns the property, but has no vested interest in, nor is expected to gain any future mitigation credits for the area under consideration for restoration. The Habitat Conservation Area (HCA) was created to compensate for impacts to threatened species and habitats from the commercial development of the properties in the vicinity of the open spaces.

The Village H parcel is a 35.7 acre area that is bounded on the south and west by Carlsbad Village Drive. There is mostly housing along the properties adjacent to Carlsbad Village Drive. To the east of Village H is a housing complex and a primary school, both with access from Tamarack Avenue. The southernmost section of Village H consists of disturbed land that contains an annual crop of exotic weeds such as crown daisy (*Chrysanthemum coronarium*), Bermuda buttercup (*Oxalis pes-caprae*), and annual grasses including rip-gut brome (*Bromus diandrus*). Most of the site appears to have been scraped bare, with some or all of the scraped earth dumped down the east side, toward the ravine that runs the length of Village H. CNLM has been mowing the site at least once annually in an attempt to lower the seed production on the crown daisy.

The most common vegetation assemblage encountered at this HCA is coastal sage scrub (CSS). Other assemblages include chamise-chaparral and native (needlegrass) grassland. Directly adjacent to the site are Eucalyptus woodland, native grassland, and coastal sage scrub. The disturbed area of Village H totals 4.9 acres. This restoration project will focus efforts on this disturbed area with the goal of vegetating this area with coastal sage scrub habitat.

B. Purpose/Need of Project

As a conservation organization, CNLM performs property analysis cost projections in the form of the Property Analysis Record (PAR). Although CNLM is careful about considering risks such as edge conditions and maintenance, weed loads expected to be maintained in perpetuity, among many other factors, CNLM cannot drive mitigation requirements that were not placed on the properties that we consider for management. CNLM can demand that certain weeds be removed, certain current or potential problems be fixed prior to taking acceptance of the CE, but restoring habitat prior to acceptance is not something we typically include in our cost analyses. This is mostly because these properties are set aside under legal requirements placed on the developers by federal and state agencies, and not by ourselves. What we do include in our cost analyses is our estimate of manpower and materials needed to reduce the weed loads in disturbed areas, and allow natural native revegetation to ensue. In some cases, this can be expected to happen quickly, but is mostly a very slow process, and is speeded up greatly by revegetation projects involving out-planting of native container plants and/or seeding with native plants.

In disturbed areas such as those described above, without financial assistance, returning a landscape to a native plant dominated one may lead to other threatened landscapes becoming imperiled. Maintaining and monitoring already viable systems is our mission, and CNLM has very limited funds dedicated to treating disturbed areas. Using endowment funds, small disturbed areas have been returned to natural assemblages, as is the case in Village R of this Preserve; but this has taken four years, several hundred hours on the part of the Preserve Manager, and this area only totals approximately ½ an acre in extent. CNLM cannot expect to successfully manage the restoration of disturbed areas into viable habitat at the rate of greater than ½ acre per four years without financial and volunteer support.

II. Project Description

A. Goals

The goal is to restore the southern end of Village H (approximately 5 acres) to coastal sage scrub, allowing for territorial expansion and/or recruitment by coastal California gnatcatchers (*Polioptila californica californica*) from coastal sage scrub vegetation already present in the parcel.

B. Methods

Site Preparation

An irrigation system will be installed that utilizes reclaimed water from nearby sources will be used. A drip irrigation system will be used to the extent practical, and some plants will be hand-watered from a truck-mounted tank during the summer months. Initial rainfall suitable to germinate the bromes, crown daisy, and buttercups will determine the timing of herbicide treatment that takes place prior to planting. A glyphosate based herbicide will be used for this purpose. Some weed control efforts have already occurred, and progress on these efforts has been made towards opening the habitat up for planting.

Planting

Plants will be procured from a local native plant nursery that offers a combination of seed sources that are close in proximity to the site, and competitive pricing. In most cases, mid-size containers measuring 3 x 6" will be used, depending on the growing conditions and preference of the nursery we choose to procure materials from. Plants may also be propagated at the nearby elementary school through the Schoolyard Habitat Program, currently in the planning stages. We will choose a mix of species that occur in the adjacent CSS habitat. Initial planting density will be approximately 310 plants per acre, and these will be planted in rows that will allow for natural recruitment from the seed produced by the installed plants. Initial planting will be performed by contractors, with subsequent planting and seeding expected to be performed by volunteers and school children.

Weed Control

Weed control will take place inside each revegetation area coincident with the first year of the project, and is expected to continue for several years. The goal will be to completely eliminate competitive non-native weeds. Weeds will be controlled mostly through the use of hand-tools and chemicals. Volunteers with hand tools will be utilized to keep easily distinguished weeds from remaining on-site, and to keep weeds from seeding the site from the edges. The Preserve Manager will treat the site with a combination of chemical and physical means through the duration of the project. Crown daisy in particular may be a very difficult species to eradicate without the use of pre-emergent herbicides. We may choose a pre-emergent herbicide or mixture of pre-emergent herbicides that suits the situation on-site (Telar, Ronstar or others). Since the plants will be placed in strips, this will save much effort in initial weed control efforts, and will also keep openings suitable for further additions from the school nursery.

III. Timeframe

The project should be finished in five years, allowing for complete exhaustion of the weed seed bank, and remedial planting in areas needing further attention. The project will be completed by fall of 2016 (Table 1).

Table 1. Timelines

Activity/Task	Estimated completion Date
Site prep/irrigation	June 2012
Planting	February 2013
Weed Control	Monthly to quarterly throughout duration of project

IV. Project Benefits to Wildlife Species and Habitats

Sensitive species: Coastal California gnatcatchers have not been observed in this area, but occupy CSS to the north of the Village H disturbed area. It is hoped that the gnatcatchers will have additional forage area and possibly enough quality CSS to add one more breeding territory.

Other species and habitat benefits: Additional useful habitat will inevitably have a positive effect on the entire animal assemblage of the HCA. There will be ample forage for small mammals, and thus forage for raptors typically found nearby, such as red tail hawks (*Buteo jamaicensis*), white tailed kite (*Elanus leucurus majusculus*) and northern harriers (*Circus cyaneus hudsonius*) will be more varied and more plentiful. The structural changes of adding shrubs and grasses will benefit many avian species that would otherwise not be found in a field of crown daisy, or a dense monoculture of black mustard. Specifically, rufous crowned sparrow (*Aimophila ruficeps canescens*), Bell's sage sparrow (*Amphispiza belli belli*), orange-throat whiptails (*Cnemidophorus hyperythrus*), and even the nearby occurring San Diego horned lizard (*Phrynosoma coronatum blainvillii*) are some of the species of concern that may benefit from these changes.

V. Partnerships and Volunteer Involvement

CNLM will contribute funds to cover/match most of the restoration activities, including irrigation, volunteer coordination, nonnative plant removal, planting, and materials. CNLM has multiple partners in the area, including the City of Carlsbad and Preserve Calavera. Both of these groups have contributed to other CNLM volunteer projects, and are very eager to participate. This project will help enhance a degraded, unsightly area in Carlsbad, which is adjacent to a public trail that many users use. The public will benefit from this project as it will provide natural habitat in replacement of disturbed habitat, and educational opportunity via volunteer efforts.

VI. Summary of Project Objectives

This project will:

- Restore approximately 5 acres of coastal sage scrub habitat
- Control weedy nonnative plant species in the restoration area
- Involve the local residents and students with the restoration project
- Enhance the experience of people using a community walking trail by restoring an area adjacent to the trail.

VII. Budget

Table 2. Budget

	Rate	FWS	CNLM	Local volunteers and schools	Total
2008 – 2011*			\$1380.00		\$1,380.00
CNLM Volunteer Coordination	\$37.00/hr		\$1,184.00		\$1,184.00
CNLM Labor	\$37.00/hr	\$1,776.00	\$1,776.00		\$3,552.00
Contractor Labor (crew of 5)	\$1,400.00/day	\$1,400.00	\$1,400.00		\$2,800.00
Container plants	309/acre @ \$2.75 each	\$2,081.00	\$2,081.00		\$4,162.00
Irrigation materials	<i>Rough estimate</i>	\$1,343.00	\$1,000.00		\$2,343.00
Soil amendments	Misc.	\$100.00	\$100.00		\$200.00
Herbicide	1 gal/acre	\$300.00	\$300.00		\$600.00
Other				1920 hours	
Totals		\$7,000.00	\$9,221.00		\$16,221.00

*Site was mowed by a contractor five times during this period

Note: The total Service's and Recipient's cost-share must remain the same; however, funding may be redistributed between practices upon prior written approval by the Service Project Officer and within scope of work.